

**WHAT IS CLAIMED IS:**

1. An excavating tooth assembly comprising:  
an adapter having an outer tapered surface configured with a substantially horizontal rearward land section and a substantially horizontal forward land section, said rearward and forward land sections each having a substantially vertical wall configured to facilitate transmission of lateral forces acting on the tooth assembly; and

an excavating tooth configured for attachment to the adapter and having a hollow mounting end defining a cavity configured to mate with the adapter, said hollow mounting end including an inner tapered surface adapted to mate with said outer tapered surface of the adapter, said inner tapered surface configured with a substantially horizontal rearward transmitting section adapted to mate with said rearward land section of the adapter, and a substantially horizontal forward transmitting section adapted to mate with said forward land section of the adapter, said rearward and forward transmitting sections each having a substantially vertical wall configured to mate with the corresponding vertical walls of the rearward and forward land sections to facilitate transmission of lateral forces from the excavating tooth to the adapter.

2. The assembly of claim 1 wherein the vertical walls of the forward land section and the forward transmitting section correspondingly diverge at least partially from a plane normal to the longitudinal centerline of the adapter, and the vertical walls of the rearward land section and the rearward transmitting section correspondingly diverge at least partially from a plane normal to the longitudinal centerline of the adapter, thereby facilitating transmission of lateral forces from the excavating tooth to the adapter.



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6. The assembly of claim 1 wherein the rearward land section of the adapter has a bore extending therethrough, and the rearward transmitting section of the tooth has a hole therein to act in conjunction with said bore for the insertion of a fastener therethrough to secure said tooth to said ~~nose~~ <sup>adapter</sup> piece.

7. The assembly of claim 1 wherein said forward and rearward land sections are formed in an upper, outer tapered surface of the adapter, and said forward and rearward transmitting sections are formed in an upper, inner tapered surface of the excavating tooth, and further comprising corresponding second forward and rearward land sections formed in a lower outer tapered surface of the adapter, and corresponding second forward and rearward transmitting sections formed in a lower inner tapered surface of the excavating tooth.

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8. An excavating tooth assembly comprising:  
an adapter having an outer tapered surface with a substantially horizontal rearward land section protruding outwardly therefrom and a substantially horizontal forward land section defined as a recess therein, said rearward and forward land sections each having a substantially vertical wall diverging at least partially from a plane normal to the longitudinal centerline of the adapter, thereby facilitating transmission of lateral forces acting on the tooth assembly; and  
an excavating tooth attached to the adapter and having a hollow mounting end defining a cavity configured to mate with the adapter, said hollow mounting end including an inner tapered surface adapted to mate with said outer tapered surface of the adapter, said inner tapered surface having a substantially horizontal rearward transmitting section defining a recess

adapted to mate with said rearward land section of the adapter, and a substantially horizontal forward transmitting section protruding therefrom for mating with said forward land section of the adapter, said rearward and forward transmitting sections each having a substantially vertical wall diverging to mate with the corresponding vertical walls of the rearward and forward land sections to facilitate transmission of lateral forces from the excavating tooth to the adapter.

10. The assembly of claim 9 wherein the vertical walls of the forward land section and the forward transmitting section define the same generally semi-circular shape, and the vertical walls of the rearward land section and the rearward transmitting section define the same generally semi-circular shape.

9. The assembly of claim 9 wherein a forward end portion of the adapter is bowed outwardly and a forward end portion of the cavity is a corresponding concave shape for matingly receiving said nose piece.

10. The assembly of claim 9 wherein the rearward land section of the adapter has a bore extending therethrough, and the rearward transmitting section of the tooth has a hole therein to act in conjunction with said bore for the insertion of a fastener therethrough to secure said tooth to said nose piece.

13. The assembly of claim 9 wherein said forward and rearward land sections are formed in an upper, outer tapered surface of the adapter, and said forward and rearward

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transmitting sections are formed in an upper, inner tapered surface of the excavating tooth, and further comprising corresponding second forward and rearward land sections formed in a lower outer tapered surface of the adapter, and corresponding second forward and rearward transmitting sections formed in a lower inner tapered surface of the excavating tooth.

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14. An excavating tooth assembly comprising:  
an adapter having an outer tapered surface configured with a substantially horizontal land section through which a bore extends;  
an excavating tooth having a cutting end and a hollow mounting end defining a cavity configured to mate with the adapter, said hollow mounting end including an inner tapered surface adapted to mate with said outer tapered surface of the adapter, said inner tapered surface configured with a substantially horizontal transmitting section through which a hole extends to act in conjunction with said bore of the adapter, said transmitting section being configured to mate with the land section of the adapter in abutting relationship to facilitate transmission of vertical forces from the excavating tooth to the adapter; and  
a fastener extending through said bore and said hole for securing said excavating tooth to said ~~nose piece~~ <sup>adapter</sup>.

15. The assembly of claim 14 wherein said land section further comprises a vertical wall diverging at least partially from a plane normal to the longitudinal centerline of said nose piece, and said transmitting section further comprises a corresponding vertical wall in abutting relationship therewith to facilitate transmission of lateral forces from the excavating

tooth to the adapter.

16. The assembly of claim 15 wherein said vertical walls are generally shaped in the form of a semi-circle at least partially surrounding the associated bore and hole.

17. The assembly of claim 14 wherein the land section protrudes outwardly from the outer tapered surface of the adapter, and the transmitting section is defined as a recess formed in the inner tapered surface of the excavating tooth.

18. The assembly of claim 14 wherein a forward end portion of said nose piece diverges at least partially from a plane normal to the longitudinal centerline of said nose piece, and said cavity in the excavating tooth further comprises a corresponding forward end portion in abutting relationship with the forward end portion of the adapter to facilitate transmission of lateral forces from the excavating tooth to the adapter.

19. The assembly of claim 18 wherein said forward end portion of the adapter is bowed outwardly and the forward end portion of the cavity is a corresponding concave shape for matingly receiving said nose piece.

20. The assembly of claim 14 further comprising a substantially horizontal forward land section formed in the outer tapered surface of the adapter and positioned forwardly of said bore, and a substantially horizontal forward transmitting section formed in the inner tapered

surface of the excavating tooth forwardly of said hole, said forward land section and forward transmitting section adapted to mate with each other in abutting relationship to further facilitate transmission of <sup>the</sup> ~~vertical~~ forces from the excavating tooth to the adapter.

21. The assembly of claim 14 wherein said land section is formed in an upper, outer tapered surface of the adapter, and said transmitting section is formed in an upper, inner tapered surface of the excavating tooth, and further comprising a corresponding second land section formed in a lower outer tapered surface of the adapter and through which said bore extends, and a corresponding second transmitting section formed in a lower inner tapered surface of the excavating tooth and through which a second hole extends to act in conjunction with said bore.

22. The assembly of claim 21 further comprising a pair of opposed, substantially horizontal forward land sections formed in corresponding upper and lower outer tapered surfaces of the adapter and positioned forwardly of said bore, and further comprising a pair of opposed, substantially horizontal forward transmitting sections formed in corresponding upper and lower inner tapered surfaces of the excavating tooth forwardly of said hole, said forward land sections and forward transmitting sections adapted to mate with each other in abutting relationship to further facilitate transmission of vertical forces from the excavating tooth to the adapter.

23. An excavating tooth assembly comprising:  
an adapter having an outer tapered surface configured with a substantially

horizontal land section protruding outwardly therefrom and through which a bore extends, said land section having a vertical wall diverging at least partially from a plane normal to the longitudinal centerline of said nose piece;

an excavating tooth having a cutting end and a hollow mounting end defining a cavity configured to mate with the adapter, said hollow mounting end including an inner tapered surface adapted to mate with said outer tapered surface of the adapter, said inner tapered surface configured with a recess defining a substantially horizontal transmitting section through which a hole extends to act in conjunction with said bore of the adapter, said transmitting section being configured to mate with the land section of the adapter in abutting relationship to facilitate transmission of vertical forces from the excavating tooth to the adapter, and having a vertical wall corresponding to the vertical wall of the land section to facilitate transmission of lateral forces from the excavating tooth to the adapter; and

a fastener extending through said bore and said hole for securing said excavating tooth to said nose piece.

24. The assembly of claim 23 wherein said vertical walls are generally shaped in the form of a semi circle at least partially surrounding the associated bore and hole.

25. The assembly of claim 23 wherein a forward end portion of the adapter is bowed outwardly and a forward end portion of the cavity is a corresponding concave shape for matingly receiving said ~~nose piece~~ *adapter*.



26. The assembly of claim 23 further comprising a substantially horizontal forward land section formed in the outer tapered surface of the adapter and positioned forwardly of said bore, and a substantially horizontal forward transmitting section formed in the inner tapered surface of the excavating tooth forwardly of said hole, said forward land section and forward transmitting section adapted to mate with each other in abutting relationship to further facilitate transmission of vertical forces from the excavating tooth to the adapter.

27. The assembly of claim 24 wherein said land section is formed in an upper, outer tapered surface of the adapter, and said transmitting section is formed in an upper, inner tapered surface of the excavating tooth, and further comprising a corresponding second land section formed in a lower outer tapered surface of the adapter and through which said bore extends, and a corresponding second transmitting section formed in a lower inner tapered surface of the excavating tooth and through which a second hole extends to act in conjunction with said bore.

28. The assembly of claim 24 further comprising a pair of opposed, substantially horizontal forward land sections formed in corresponding upper and lower outer tapered surfaces of the adapter and positioned forwardly of said bore, and further comprising a pair of opposed, substantially horizontal forward transmitting sections formed in corresponding upper and lower inner tapered surfaces of the excavating tooth forwardly of said hole, said forward land sections and forward transmitting sections adapted to mate with each other in abutting relationship to further facilitate transmission of vertical forces from the excavating tooth to the adapter.

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An assembly for releasably attaching an excavating tooth in a row of teeth to an excavating implement, comprising:

an adapter having a base portion attachable to the excavating implement and a nose portion extending forwardly from said base portion, said nose portion having laterally spaced sides and converging upper and lower surfaces terminating at a forward end, with the base portion of the adapter defining an elongated aperture open at opposite ends, and with the upper and lower surfaces defining, in combination, at least three generally parallel support surfaces, each support surface opening to the forward end of the adapter surrounded by a generally vertical stabilizing surface extending normal to and between the support surface and the respective upper or lower surface of the adapter, with each stabilizing surface having a lateral width less than the lateral spacing between the sides of the nose portion of said adapter;

an excavating tooth defining a blind cavity configured to snugly fit endwise about the nose portion of the adapter, with the blind cavity defined by said tooth having upper and lower surfaces that complement the upper and lower surfaces of said nose portion of the adapter and include structure for abutting and cooperating with the three support surfaces on the adapter, and wherein the stabilizing surface surrounding each support surface of the adapter being adapted to abut in mating relationship with said structure on said tooth to transfer side load forces imparted to the tooth toward a centerline of the adapter, said tooth further defining a pair of axially aligned openings that open to the cavity in the tooth; and

pin structure extendable through the openings in the tooth and through the aperture in said adapter to releasably hold the tooth to the adapter.

30. An assembly for attaching an earth engaging tooth to a ground engaging implement, comprising:

a support having a base attachable to the implement and a nose extending forwardly from said base, said nose having laterally spaced sides and converging upper and lower surfaces terminating at a forward end, said base of the support defining an elongated aperture open at opposite ends, and with the upper and lower surfaces defining, in combination, at least three generally parallel support surfaces, each support surface opening to the forward end of the support and is surrounded by a generally stabilizing surface extending normal to and between the support surface and the respective upper or lower surface of the support;

said tooth having upper and lower surfaces that complement the upper and lower surface of said nose of the support and include structure for abutting and cooperating with the three support surfaces on the support, and wherein the stabilizing surface surrounding each support surface of the support being adapted to abut in mating relationship with said structure on said tooth, said tooth further defining a pair of axially aligned openings that open to the cavity in the tooth; and

pin structure extendable through the openings in the tooth and through the aperture in said support to releasably hold the tooth to the support.

Sub 31. An assembly for attaching a ground engaging tooth to a ground engaging implement comprising:

a support attachable at a rear end to the implement and having a nose extending forwardly to a free terminal end, said nose having laterally spaced and opposed sides and upper

and lower surfaces converging toward the terminal end of said support, said support further defining an opening extending through the support toward the rear end thereof and which is open at opposite ends, said upper and lower surfaces each defining a pair of fore-and-aft spaced support surfaces, with each support surface having a lateral width less than the distance between said sides and opening to the terminal end of said support, each support surface includes a stabilizing surface extending in surrounding and normal relation relative to and between the support surface and the respective upper and lower surfaces of the support;

said tooth defining a blind cavity configured to snugly fit endwise about the nose of the adapter and including upper and lower surfaces that complement the upper and lower surfaces on the nose of the support, with the upper and lower surfaces of the blind cavity each including first and second structures for abutting and cooperating with the pairs of support surfaces on the upper and lower surfaces of the support, with the stabilizing surface of each support surface on the support being adapted to abut in mating relationship with structures on the tooth to transfer side loads imparted to the tooth to the center of the support, said tooth further defining a pair of openings arranged along a centerline passing through the blind cavity in the tooth; and

pin structure extendable through the openings in the tooth and the aperture in said support for attaching said tooth to said support.

32. An assembly for attaching a ground engaging tooth to a ground engaging implement, comprising: a support attachable at a rear end to the implement and having a nose extending forwardly to a free terminal end with a forwardly projecting curvilinear configuration,

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said nose having laterally spaced and opposed sides and upper and lower surfaces converging toward the terminal end of said support, said support further defining an opening extending through the support toward the rear end thereof and which is open at opposite ends, said upper and lower surfaces each defining first and second fore-and-aft spaced and vertically aligned support surfaces, with each support surface having a lateral width less than the distance between said sides, with the first support surface on the upper and lower surfaces of the support extending rearwardly from an d opening to the terminal end of said support and with the second support surface on the upper and lower surfaces of the support being disposed toward the rear end of the support, each support surface including a stabilizing surface extending in surrounding and normal relation relative to and between the support surface and the respective upper and lower surfaces of the support;

said tooth defining a blind cavity configured to snugly fit endwise about the nose of the adapter and including upper and lower surfaces that complement the upper and lower surfaces on the nose of the support, wherein the blind cavity of the tooth defines a curvilinear surface that is a mirror image of the curvilinear surface of the terminal end of said support such that the tooth is subject to self-centering in response to horizontal loads being applied thereto, and with the upper and lower surface of the blind cavity each including first and second structures for abutting and cooperating with the first and second support surfaces on the upper and lower surfaces of the support, and wherein the stabilizing surface of each support surface on the support being adapted to abut in mating relationship with the structures on the tooth to transfer side loads imparted to the tooth to the center of the support, said tooth further defining a pair of openings arranged along a centerline passing through the blind cavity in the tooth; and

pin structure extendable through the openings in the tooth and the aperture in said support for attaching said tooth to said support.

33. An excavating tooth assembly, comprising:  
an adapter having a base portion configured for attachment to excavating equipment and a nose portion integrally formed with and extending from said base portion;  
an elongated excavating tooth having a cutting edge toward one end thereof and a blind cavity opening to an opposite end thereof, said blind cavity being configured to snugly fit about and along a lengthwise portion of the nose portion of said adapter; and  
an elastomeric member disposed between a free end of said nose portion on said adapter and a terminal wall of said blind cavity on said tooth for absorbing endwise directed impact forces between said tooth and said adapter incurred during operation of said excavating tooth assembly.

34. The excavating tooth assembly according to Claim 33 wherein said elastomeric member is formed from an elastomeric material having a ratio of plastic deformation to elastic deformation which is greater than 1.5 to 1.

35. A multipiece excavating tooth assembly, comprising:  
an excavating tooth adapted for releasable association along and about a lengthwise portion of an adapter, and wherein a elongated pin passing through said adapter and operably associated with said tooth maintains said tooth in operable association with said adapter;

and

elastomeric material having a ratio of plastic deformation to elastic deformation greater than 1.5 to 1 is disposed between the tooth and the adapter for inhibiting movement therebetween during operation of the excavating tooth assembly thereby reducing impact forces between adjacent confronting surfaces defined on said adapter and said tooth.

36. The excavating tooth assembly according to Claim 35 wherein said adapter includes a nose portion configured with upper and lower slanting surfaces converging toward a free end of the adapter, and wherein said excavating tooth defines a blind cavity opening to a rear end thereof, said blind cavity having a configuration generally corresponding to the configuration of the nose portion of said adapter.

37. The excavating tooth assembly according to Claim 35 wherein said elastomeric material is formed as an elongated sleeve which fits over and along the nose portion of said adapter such that an layer of elastomeric material is disposed between confronting surfaces defined on the nose portion of the adapter and blind cavity defined by said excavating tooth after the excavating tooth is assembled to the adapter.

38. The excavating tooth assembly according to Claim 36 wherein the nose portion of the adapter and the blind cavity defined by said tooth each include stabilizing lands disposed thereon in cooperative relationship relative to each other to stabilize operation of the tooth assembly during an excavating operation.

39. The excavating tooth assembly according to Claim 38 wherein said stabilizing land comprises a pair of generally horizontal surfaces defined on said adapter and said tooth in confronting relationship relative to each other, and wherein said elastomeric material is disposed between the horizontal surfaces to cushion movements therebetween.

40. The excavating tooth assembly according to Claim 36 wherein the nose portion of the adapter and the blind cavity defined by said tooth each include fore-and-aft spaced pairs of stabilizing lands disposed thereon in cooperative relationship relative to each other to stabilize operation of the tooth assembly during an excavating operation.

41. The excavating tooth assembly according to Claim 38 wherein each pair of stabilizing lands comprises a pair of generally horizontal surfaces defined on said adapter and said tooth in confronting relationship relative to each other, and wherein said elastomeric material is disposed between the horizontal surfaces to cushion movements therebetween.

42. A multipiece excavating tooth assembly, comprising:  
an adapter having a base portion configured for attachment to excavating equipment and a nose portion extending from said base portion;  
an elongated excavating tooth having front edge toward one end thereof and a blind cavity opening to a rear end thereof, said blind cavity being configured to snugly fit about and along a lengthwise portion of the nose portion of said adapter;  
an elongated pin for releasably locking the tooth to said adapter, said pin passing



endwise through said adapter into operable association with said tooth, and wherein said pin is resiliently biased into position to releasably lock said tooth to said adapter; and

a spring disposed between said adapter and said tooth for augmenting the locking function of said pin.

43. The multipiece excavating tooth assembly according to Claim 42 wherein said spring is operably disposed between said nose portion of said adapter and a terminal wall of the blind cavity defined by said tooth.

44. The multipiece excavating tooth assembly according to Claim 42 wherein said spring is formed from elastomeric material having a ratio of plastic deformation to plastic deformation greater than 1.5 to 1.

45. The multipiece excavating tooth assembly according to Claim 44 wherein said elastomeric material has a sinusoidal configuration between opposite lateral ends thereof.

46. The multipiece excavating tooth assembly according to Claim 44 wherein said elastomeric material has a rippled configuration between opposite lateral ends thereof for facilitating compression and expansion of said spring in response to forces acting thereon.

47. The multipiece excavating tooth assembly according to Claim 42 wherein elastomeric material is disposed between the nose portion of said adapter and opposed walls

defined by said blind cavity of said tooth for absorbing impact forces occurring therebetween during operation of the excavating tooth assembly.

48. The multipiece excavating tooth assembly according to Claim 42 wherein said nose portion of the adapter and opposed walls defined by the blind cavity of said tooth combine to define stabilizing lands for inhibiting movement between the tooth and the adapter during operation of the excavating tooth assembly.

49. The multipiece excavating tooth assembly according to Claim 48 wherein elastomeric material having a ratio of plastic deformation to elastic deformation greater than 1.5 to 1 is disposed between the stabilizing lands on said adapter and said tooth.

50. The multipiece excavating tooth assembly according to Claim 48 wherein the stabilizing lands include generally flat horizontal surfaces arranged in confronting relation relative to each other for inhibiting movement between said tooth and the adapter during an excavating operation of the tooth assembly.

51. The multipiece excavating tooth assembly according to Claim 48 wherein each stabilizing land further includes generally vertical walls depending from the generally flat surfaces, and wherein the vertical wall on the stabilizing land defined by said adapter and the vertical wall defined by the stabilizing land on said tooth are arranged in confronting relation relative to each other when the tooth is arranged in operable combination with the adapter.

52. The multipiece excavating tooth assembly according to Claim 51 wherein elastomeric material is disposed between the confronting vertical walls of the stabilizing lands when the tooth is arranged in operable combination with the adapter.

53. The multipiece excavating tooth assembly according to Claim 52 wherein said elastomeric material has a ratio of plastic deformation to elastic deformation greater than 1.5 to 1.

54. An excavating tooth assembly for ground engaging equipment, comprising:  
a support attachable at a rear end to the equipment and having a nose extending forwardly to a free terminal end, said nose having laterally spaced and opposed sides and upper and lower surfaces converging toward the terminal end of said support, said support further defining an opening extending through the support toward the rear end thereof and which is open at opposite ends;

an excavating tooth defining a blind cavity opening to a rear end of said tooth and configured to snugly fit endwise about and along the nose of the support and including upper and lower surfaces that complement the upper and lower surfaces on the nose of the support, said tooth further defining a pair of generally aligned openings which open to the blind cavity in the tooth;

a fastener extendable through the openings in the tooth and the aperture in said support for releasably locking said tooth to said support; and

elastomeric material having a ratio of plastic deformation to elastic deformation

greater than 1.5 to 1 disposed between the upper and lower surfaces defined by said support and said tooth.

55. The multipiece excavating tooth assembly according to Claim 54 wherein the nose of said adapter and opposed walls defined by the blind cavity of said tooth combine to define stabilizing lands for inhibiting movement between the tooth and the adapter during operation of the excavating tooth assembly.

56. The multipiece excavating tooth assembly according to Claim 54 wherein said elastomeric material is disposed between the stabilizing lands on said adapter and said tooth.

57. The multipiece excavating tooth assembly according to Claim 54 wherein the stabilizing lands include generally flat horizontal surfaces arranged in confronting relation relative to each other for inhibiting movement between said tooth and the adapter during an excavating operation of the tooth assembly.

58. The multipiece excavating tooth assembly according to Claim 57 wherein each stabilizing land further includes generally vertical walls depending from the generally flat surfaces, and wherein the vertical wall on the stabilizing land defined by said adapter and the vertical wall defined by the stabilizing land on said tooth are arranged in confronting relation relative to each other when the tooth is arranged in operable combination with the adapter.

59. The multipiece excavating tooth assembly according to Claim 58 wherein elastomeric material is disposed between the confronting vertical walls of the stabilizing lands when the tooth is arranged in operable combination with the adapter.

60. The multipiece excavating tooth assembly according to Claim 54 wherein said fastener includes a locking member biased into releasable locking engagement with a retaining pin for holding said pin against movement during operation of said excavating tooth assembly.

61. The multipiece excavating tooth assembly according to Claim 59 further including a spring disposed between said adapter and said tooth for augmenting the locking function of said fastener.

62. The multipiece excavating tooth assembly according to Claim 61 wherein said spring comprises a elastomeric member disposed between the free end of the nose on said adapter and the terminal wall of the blind cavity defined by said tooth.

63. A multipiece excavating tooth assembly, comprising:  
an adapter having a base portion attachable to excavating equipment and a nose portion extending forwardly from said base portion, said nose portion having a series of exterior surfaces including laterally spaced side surfaces and upper and lower surfaces terminating at a forward end, with the base portion of the adapter defining an elongated aperture open at opposite ends;

an excavating tooth defining a blind cavity opening to a rear end of said tooth, said blind cavity being configured to snugly fit endwise along and about the nose portion of the adapter, with the blind cavity defined by said tooth having a series of interior surfaces including upper and lower surfaces configured to complement the upper and lower surfaces of said nose portion of the adapter, said tooth further defining a pair of openings arranged along a centerline passing through the blind cavity in the tooth;

a fastener extendable through the openings in the tooth and through the aperture in said adapter to releasably hold the tooth to the adapter; and

a sleeve adapted to fit along and about the nose portion of said adapter in surrounding relation relative thereto and between the exterior surfaces of said adapter and the interior surfaces of the blind cavity defined by said tooth for blunting impact forces therebetween incurred during operation of said excavating tooth assembly, and wherein said sleeve is fabricated from an elastomeric material having a ratio of plastic deformation to elastic deformation greater than 1.5 to 1.

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